

Three-dimensional organization of the hepatic artery terminal branches: a scanning electron microscopic study of vascular corrosion casts of rat liver

**Luigi Pannarale¹, Paolo Onori², Federica Borghese¹,
Davide Conte¹ and Eugenio Gaudio¹.**

¹ Department of Human Anatomy, *State University "La Sapienza" of Rome.*

² Department of Experimental Medicine, *State University of L'Aquila.*

Key words: liver, hepatic artery, microcirculation, vascular corrosion casts.

SUMMARY

The hepatic artery plays an important role in the nourishment of liver parenchyma. The arterial distribution generates debate on where the artery terminates in the liver although it is accepted that terminal branching of hepatic artery opened into sinusoids and form arterio-portal anastomosis. This implies that sinusoids are fed by both arterial and portal vessels characterized by different pressures. The presence of a double feeding to the sinusoids from the vena porta, at a pressure of 6-7 cm H₂O, and from the hepatic artery, at a pressure of 12-25 cm H₂O, has generated many studies for the need to explain the prevalence of flow from the vena porta. For this reason, we have studied the terminal hepatic artery branches in the rat by using special microvascular corrosion casting procedure which makes possible to better follow the hepatic artery terminal branches.

Twelve young sexually mature male and female Wistar rats were used in this study. More than one hundred vascular corrosion casts of terminal hepatic arterioles were studied by Scanning Electron Microscopy. Histological samples were prepared using standard techniques for light microscopy.

The experimental approach allow to easily follow the three-dimensional course of hepatic artery branches which is extremely difficult in standard injections.

In all our observations of the rat liver vascular corrosion casts, terminal hepatic artery branches do not end directly in the sinusoidal beds. Terminal hepatic artery branches end into peribiliary plexus, periportal plexus and single capillaries of the portal space. We have not found any arterio-venous shunt nor any arterial vessel flowing into a venous vessel or a sinusoid. This means that only venous blood at a lowered pressure reaches the vena porta branches and the sinusoids.

INTRODUCTION

The liver receives dual blood supply from the hepatic artery and the portal vein. The portal system consists of a conducting system that shows frequent branch-